

Evaluation of New York ISO 2002 Price-Responsive Load Programs

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Transmission Reliability Research Review

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Overview

- Technical support to New England Demand Response (NEDRI)/FERC initiative
- Evaluation of NYISO Price-Responsive Load (PRL) 2002 Programs
 - Program features and performance
 - Barriers to participation in “economic” demand response (DR) programs
 - Role of DR enabling technologies
 - Implications for NYSERDA, NYISO & DOE



New England Demand Response Initiative

- Facilitated stakeholder process of ~40 industry, govt., consumer & environmental groups
- Objective: develop comprehensive, coordinated set of demand-response strategies/programs for region
- Funders: DOE, EPA, ISO-NE
- Coordination, collaboration with FERC SMD DR initiatives: New England as “DR test bed”
- Website: <http://nedri.raabassociates.org/>



Technical support for New England DR initiative

- DOE funding from DEER office: Restructuring and Transmission Reliability Program
- NEDRI Technical Team member (LBNL)
- Prepare Framing papers on key issues
 - PRL Programs (LBNL)
 - Implications for Energy Efficiency (Schlegel/LBNL)
- Develop “best practice” program designs
 - Day-ahead market, emergency & mass market DR pgm (LBNL)
 - Energy efficiency strategies to reduce peak demand (Schlegel/LBNL)
 - Long-term resource adequacy options (Hirst/LBNL)
- Demonstration projects
 - Customer load participation in ancillary services markets (ORNL)



NY Project Goals

Application

- ✓ Identify and quantify the impact of key drivers to PRL participation
- ✓ Assign performance index to participants
- ✓ Quantify market impacts, benefits/costs
- ✓ Identify key influences to participation by Market Makers

Market segmentation,
identify under-served
markets

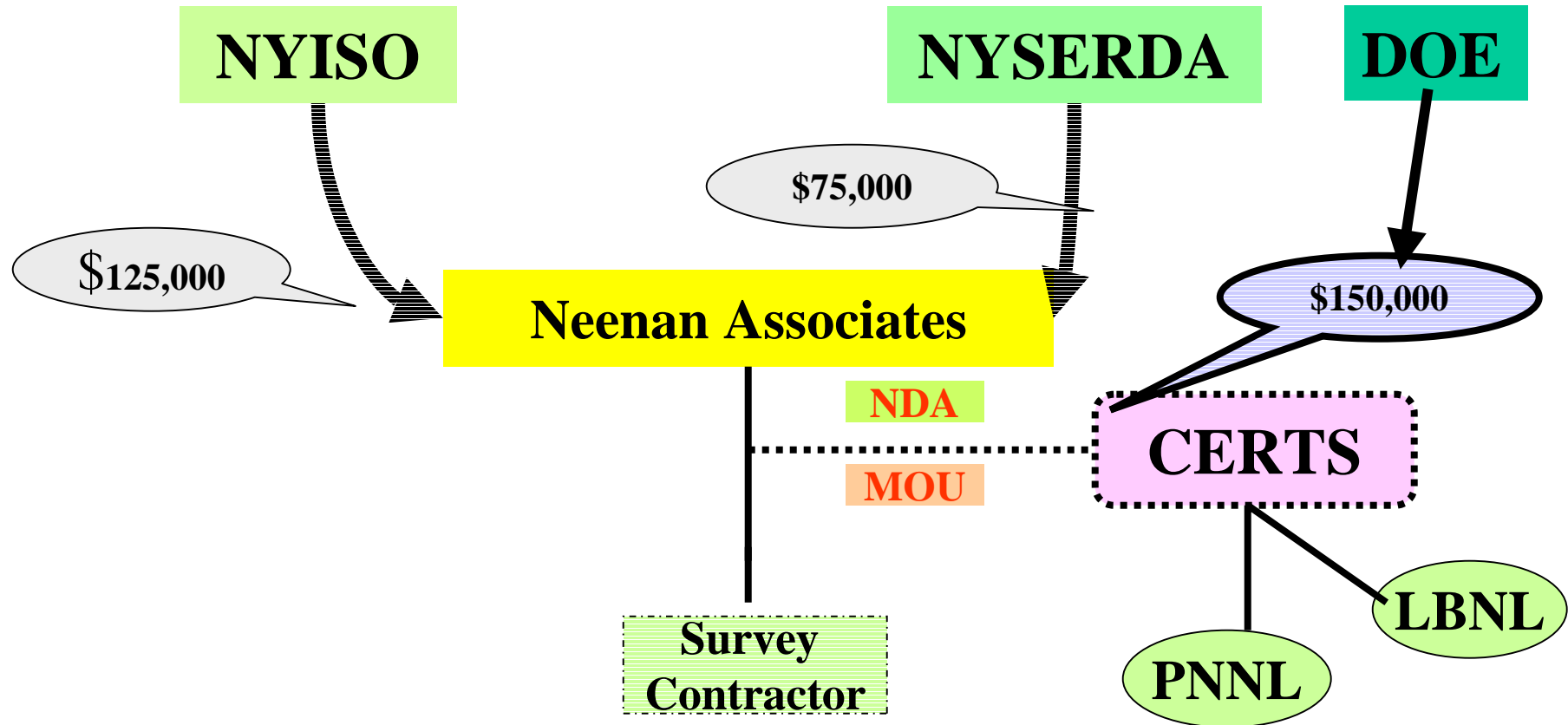
Technology
assessments/gaps,
Business case planning

System
Reliability
Resource

Identify market
barriers; program
design changes



NYISO PRL 2002 Evaluation: Project Organization



NYISO Electricity Markets

Customer-Supplied Resource Programs

Installed
**Capacity/Special
Case Resources**

ICAP/SCR

DADRP

Day Ahead
Demand
Response
Program

EDRP

Emergency
Demand
Response
Program

- **Generation Assurance - ICAP**
- **Energy** - in two sequential markets:
 - **Day-Ahead Market (DAM)**
 - Real-Time (RTM)
- **Direct-bid Ancillary Services**
 - Operating Reserve
 - Regulation
 - **Emergency**
- **Cost Based Ancillary Services**
- **Congestion Protection** - the “TCC”

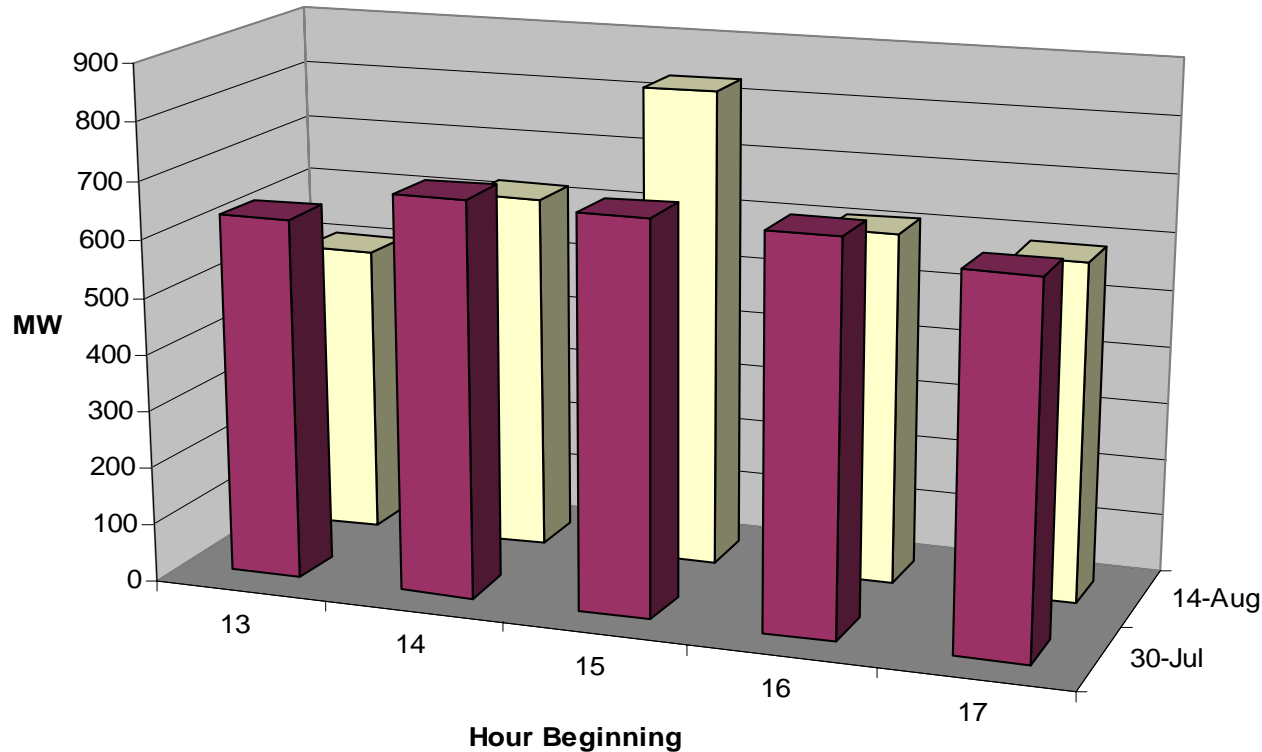


NYISO PRL Program Features

	Market Function	Eligible	Event Notice	Payment
ICAP	Installed Capacity	> 100 kW can aggregate (like EDRP)	Day-ahead advisory, 2 hour notice	\$/kW Market value of ICAP
EDRP	Emergency Capacity	> 100 kW can aggregate	2 hour notice	Greater of \$.50/kWh or RTM LBMP
DADRP	Economic Energy	1 MW increments, can aggregate	Bid by 5am, day-ahead, notice by noon	Greater of Bid \$/kWh or DAM LBMP



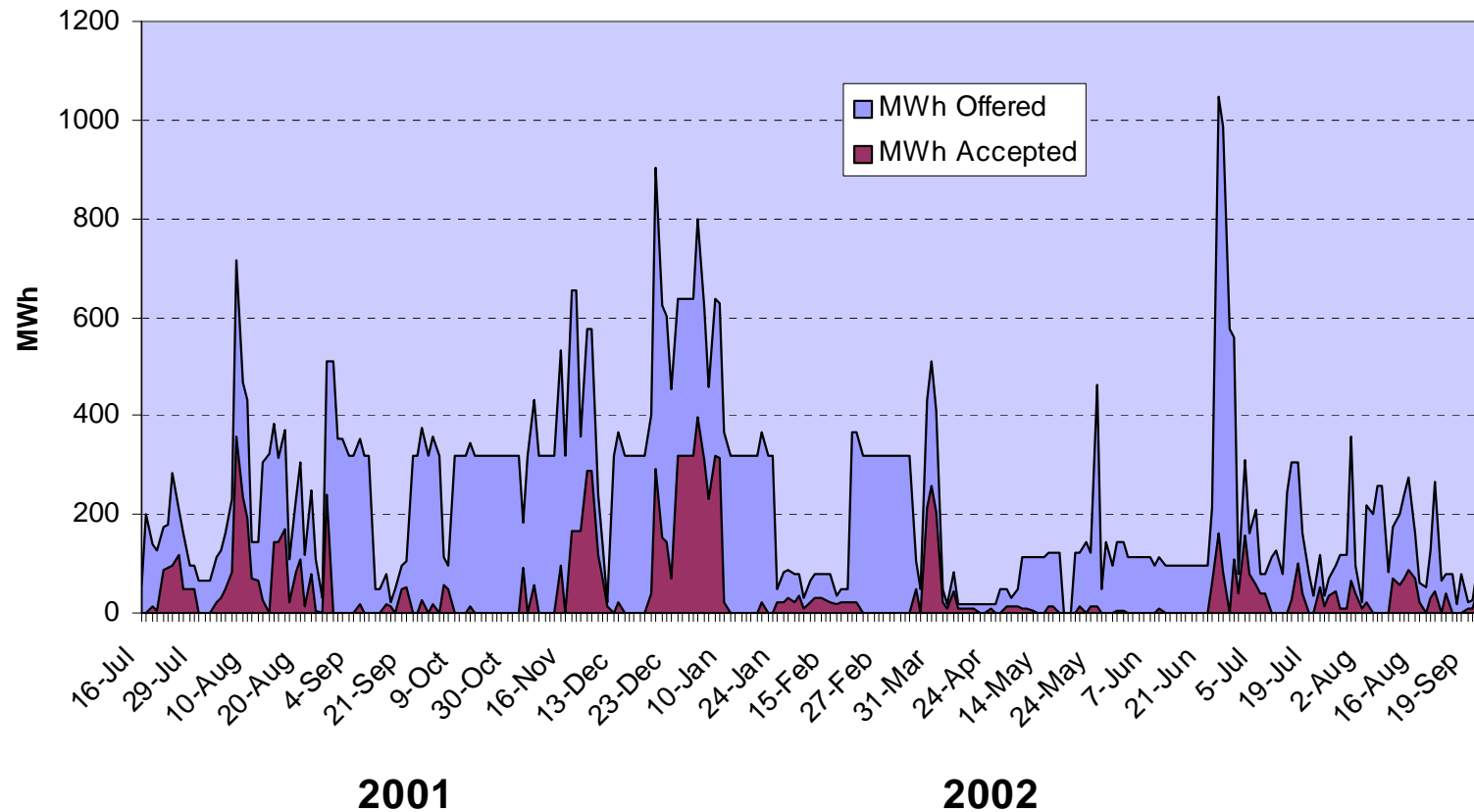
EDRP Summer 2002 Performance



- 1702 participants enrolled; ~650 MW (avg) curtailed; \$3.5M in payments
- Load curtailment accounts for ~75%; Onsite generation = ~20%
- Location: NYC/LI (~20%), Western NY (55~%), Capital (~25%)
- While Large C/I are prominent, participation includes significant diversity in both size & business type and about 22 MW of aggregated, small non-interval metered customers in NYC



DADRP Bids and Scheduled Load



- Fewer customer bids accepted and scheduled in 2002 (~7 MW average)
- Customer offer prices generally low (\$50-150/MWh), given DAM price environment

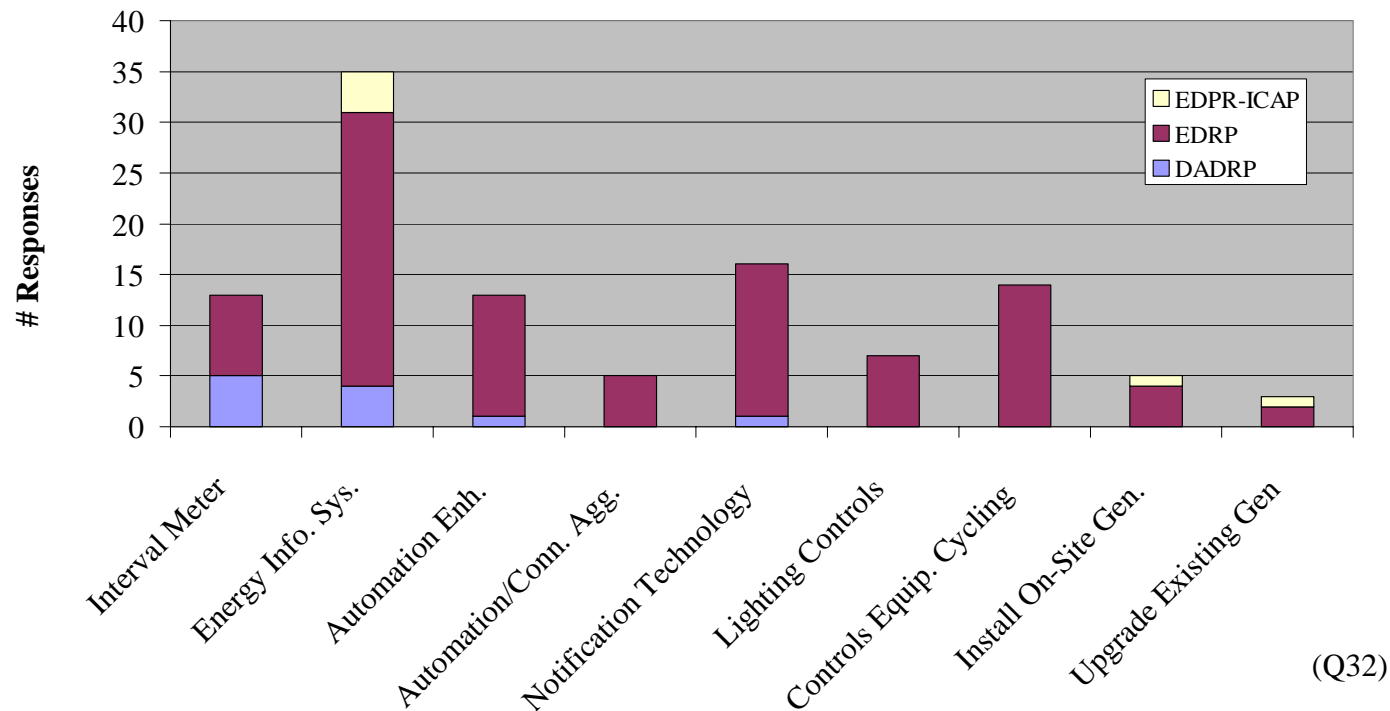


Summary: Customer Survey & PRL Audit

- 144 Respondents: 18% response rate
- Characterize “typical” non-participant vs. program participants (EDRP, DADRP, and EDRP/ICAP)
 - NP have lower median summer peak demand (750 kW) vs. DADRP (14 MW) and EDRP (1.7 MW)
 - DADRP are manufacturing firms
 - NP are Govt/institution (32%), manufacturing (22%), trade and comm. Office (~12% each)
- Largest Impediments to Shifting Electricity during summer peak day
 - ~90% of commercial and ~60% of institutional customers identified occupant comfort
 - ~75% of industrial customers identified production schedules



Customer Survey: DR Enabling Technologies Installed



- Most popular technologies:

- Energy information & management systems (63%)
- Notification/communications technologies (29%)
- Automation for load mgmt and aggregation (30%)
- Direct Load Control for lighting (13%) or equipment cycling (25%)

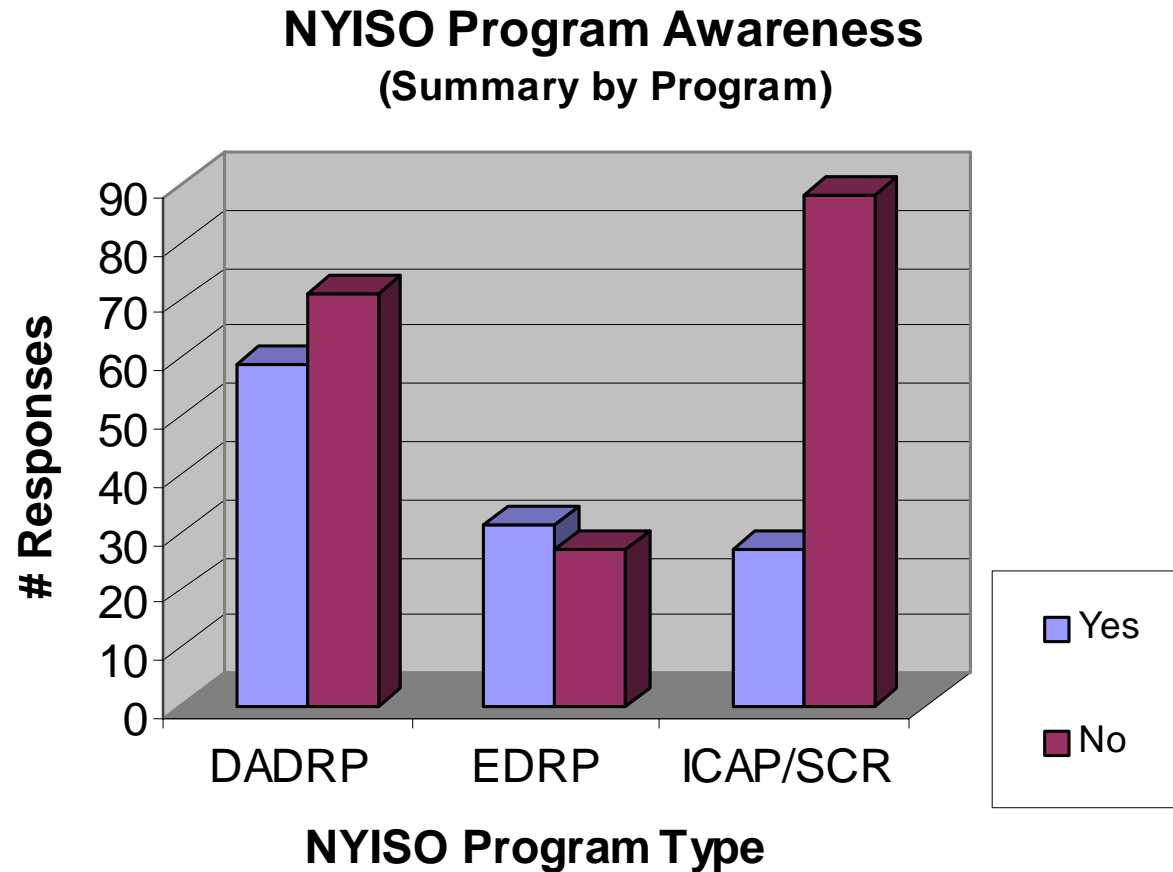


Barriers to DADRP Participation

- Organizational/institutional
 - Low Program Awareness Levels (*)
 - Information/knowledge barriers (*)
 - Customers don't fully value ancillary benefits of DR enabling technologies (*)
 - Concerns about occupant comfort
- Economic/program-design related
 - Potential benefits don't justify risks (*)
 - High customer bid price thresholds and short payback periods for DR investments (*)
 - Perceived program design problems
- Technology-related
 - Limited assessments of DR enabling technologies



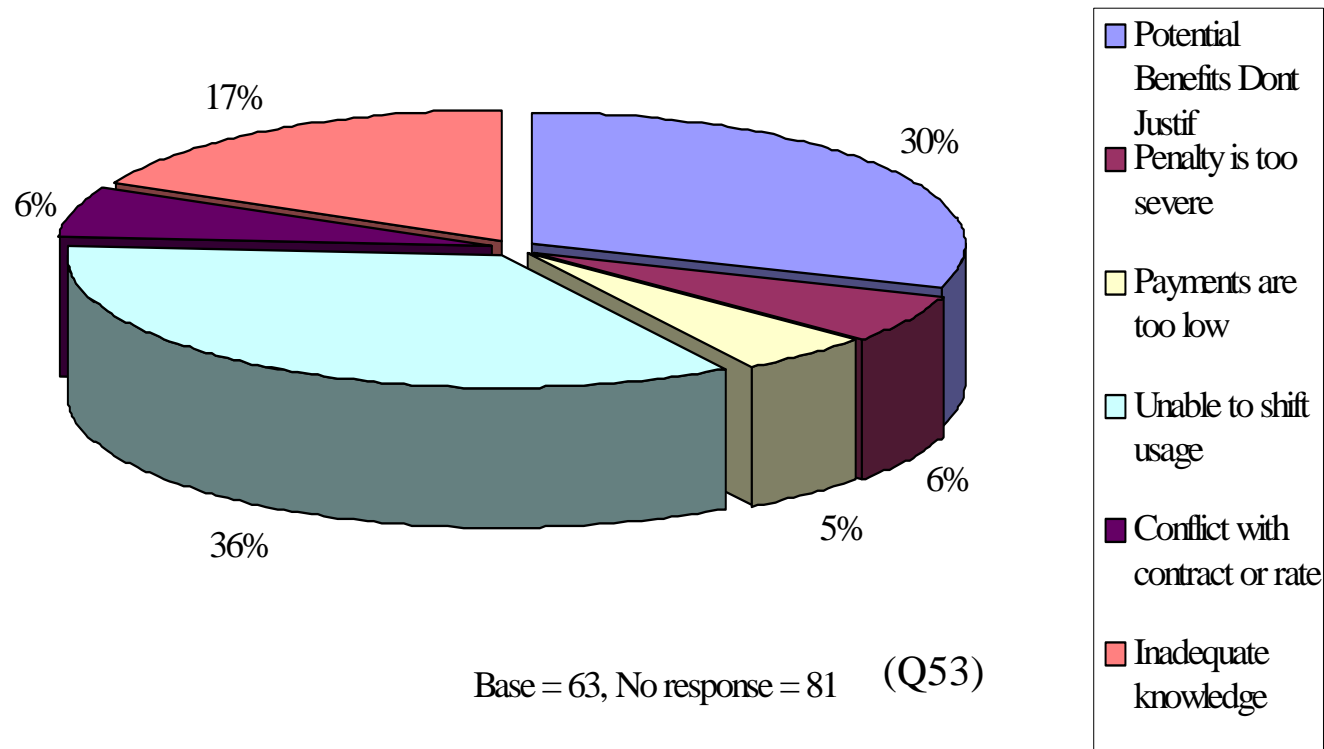
Low Awareness Levels Limit Participation



- Awareness levels among DADRP and ICAP/SCR non-participants are low: 45% and 23% respectively



Primary Reason for Not Participating in DADRP



- Potential benefits don't justify risks (30%), inability to shift usage (36%) and inadequate knowledge of program requirements (17%) given as primary reason for not participating in DADRP



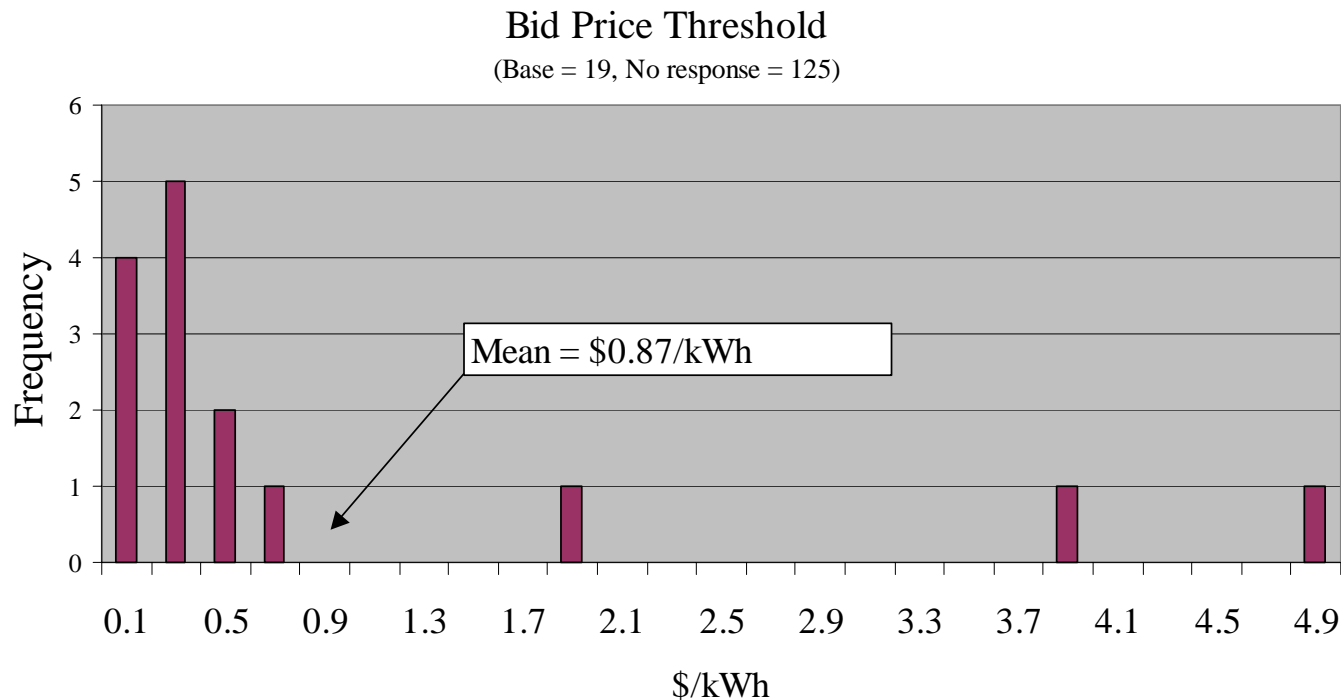
Lack of knowledge of Day Ahead Market and bid price strategies is barrier

	Creating Curtailment Plan		Monitoring Energy Prices		Determining Bid Prices	
	DADRP	Other	DADRP	Other	DADRP	Other
Not Comfortable	1	6	1	12	1	17
Comfortable	9	14	9	7	9	3
Total	10	20	10	19	10	20

- Confidence level of DADRP vs EDRP participants
 - 85% not comfortable determining bid prices
 - 63% not comfortable monitoring energy prices
- Need education/training on market price formation so customers can develop and execute bidding strategy



Bid price thresholds are high for many customers



- Customers asked about their bid price minimum threshold
- Bid prices ranged from \$0.05 - 5.00/kWh with median value of ~\$0.50/kWh



Customers don't recognize ancillary benefits of DR enabling technologies

- Customers asked to value benefits on 1(low) to 5 scale (high)
- Energy information tools ranked highest (3.5); Customers give mid-range values to benefits of other technologies

Technology	Benefit	Mean
1. Interval meters with two-way communication	Better manage peak energy and demand charges with day-after access to facility interval data	2.78
2. Load Control	Shed load and/or initiate on-site generation, in order to reduce demand charges	2.87
3. Upgrade switchgear for on-site generation	Increase load mgmt. flexibility to modify load profile for more desirable energy procurement	2.61
4. Upgrade on-site generation for dual-fuel capability	Fuel flexibility to mitigate fuel price volatility	2.23
5. Enhanced energy management or control system	Ability to schedule and/or automate load mgmt., and reduce labor for facility operations, increase reliability to integration with maintenance procedures	2.97
6. Energy information tools	View individual and multiple facility interval electricity data, increase understanding of loads for lower cost energy procurement	3.47



Summary: DADRP Evaluation Results

- Barriers are primarily organizational, institutional, information/knowledge, & customer economics
 - customers are skeptical: wary of investments with long paybacks and reluctant to undertake behavioral changes
 - most customers not yet comfortable bidding into “economic” program (but will respond to system emergency defined by ISO)
 - customers not yet convinced of “spill over” benefits of DR enabling technologies
- Role of DR enabling technologies: necessary but not sufficient condition to elicit sustained customer participation
- Lack of stable DR market structure/program rules limits interest by DR market makers and customers



Implications for NYSERDA DR Programs

- Develop long-term DR strategy
 - Consistent with NYISO mkt. evolution, PSC plans for retail choice, and state resource adequacy/planning
 - Performance goals and metrics (B/C framework)
- Program integration & marketing:
 - integrate DR with EE program strategies in various mkt segments
 - link system reliability benefits to customer participation in “economic” programs
- More targeted solicitations tied explicitly to program/policy goals
 - focus: downstate NY, under-served markets, incent DADRP
- Develop broad set of customer info/educational tools
- Characterize role of DR Market Makers
 - analyze PRL “business” models for LSEs, traders, ESCOs, vendor, & CSP as it relates to leveraging public benefit funds/programs



Implications for NYISO PRL Programs

- Develop strategies to increase customer awareness and knowledge of PRL programs: rules, benefits, risks
- Assess program design changes that will facilitate participation by DR “market makers”
 - customer aggregation: minimum bid thresholds
 - more flexible approaches to submitting bids
- Work with NYPSC to align financial incentives of regulated LSE (e.g. cost recovery) and their approach to rate design (e.g., dynamic pricing, definition of peak periods for demand charges)



Implications for DOE Transmission Reliability Program

- Role of DR enabling technologies
 - Large Industrial: process control in place: EIS/notification technologies help
 - Comm'l/institutional bldg: DR needs to be “automated, seamless, energy-manager friendly, minimal occupant comfort impact”
- Impact of DR on market operations
 - ISOs changes to scheduling and dispatch but need R&D on how to incorporate DR resources into next generation of ISO systems/software to realize full potential
- EDRP not serving as feeder into “economic” DR
 - May need DR specified as part of SMD to convince customers to learn about market price discovery



Next Steps

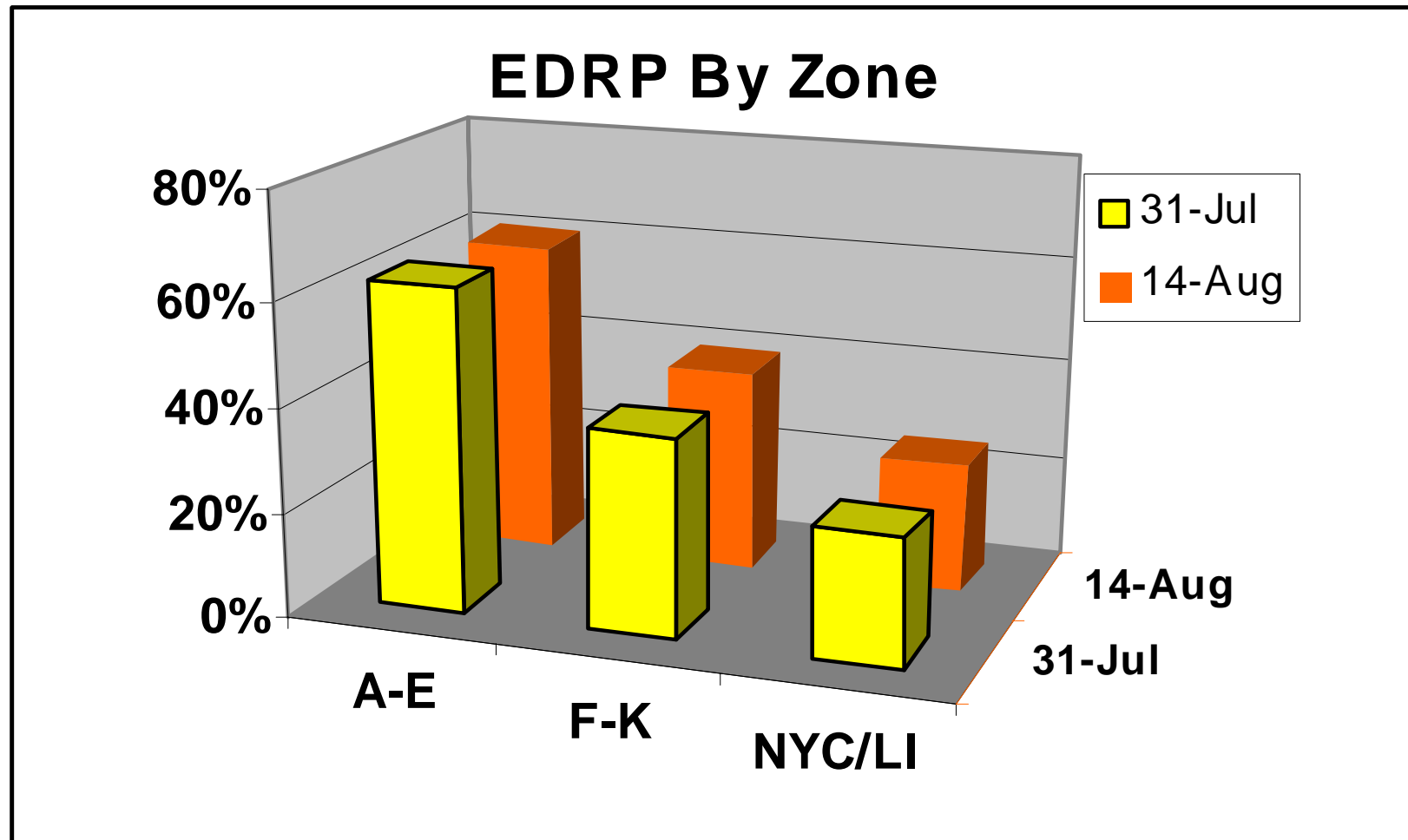
- Disseminate results and lessons learned from evaluation of 2002 NYISO PRL programs
- Monitor NYISO development of Real-time Market and impacts on PRL programs
- Technical Support to NEDRI on PRL and Ancillary Services demonstration project(s)
- Participate in NYISO PRL Working Group and ISO-NE Load Response Group
- Integrate LAAR experiences into Competitive Solicitations. Build on experiences from:
 - Lessons learned from 2001 and 2002 NYISO, CA and ISO-NE demand response programs
 - Consider synergy between future NY Real-time Markets and goal of solicitation.



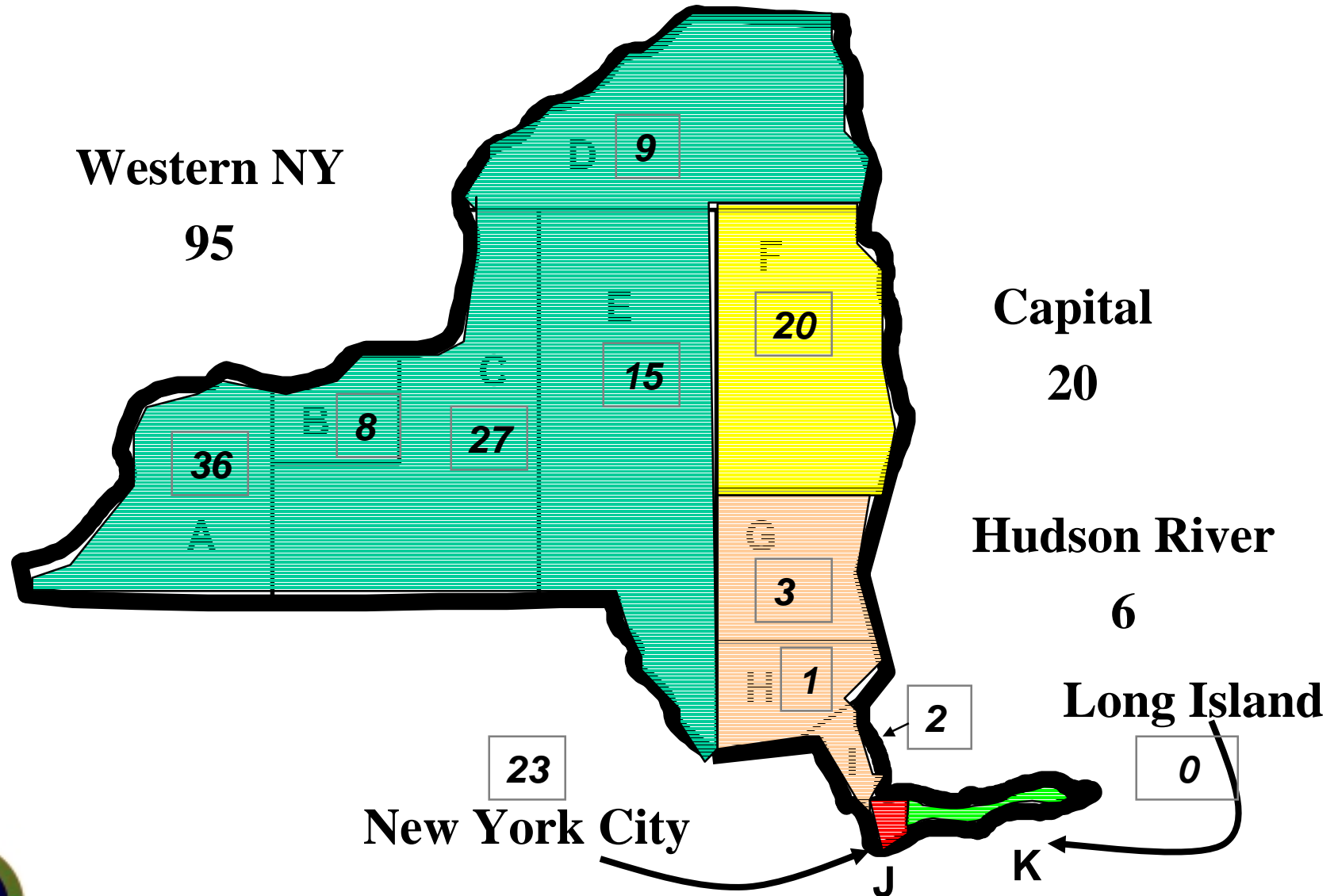
Background slides



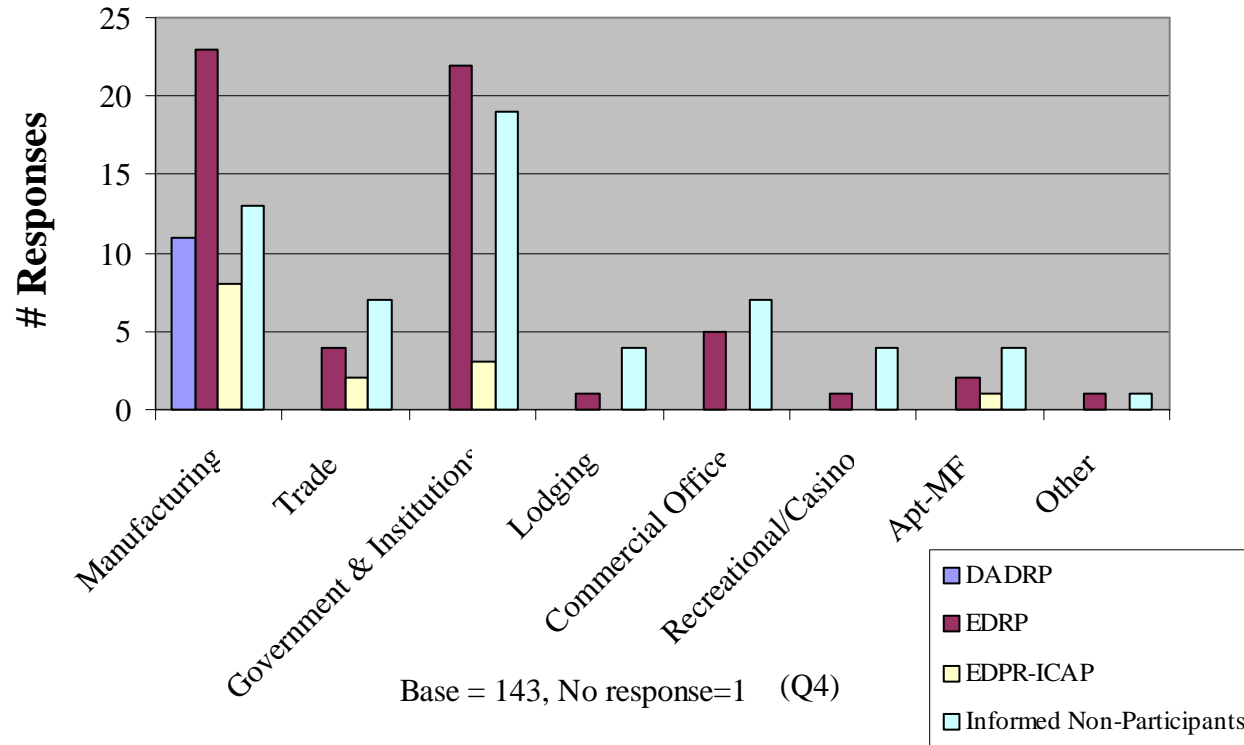
Most EDRP Load Curtailments occur in Western NY and Capital Region, not downstate



Survey Response by "SuperZone"



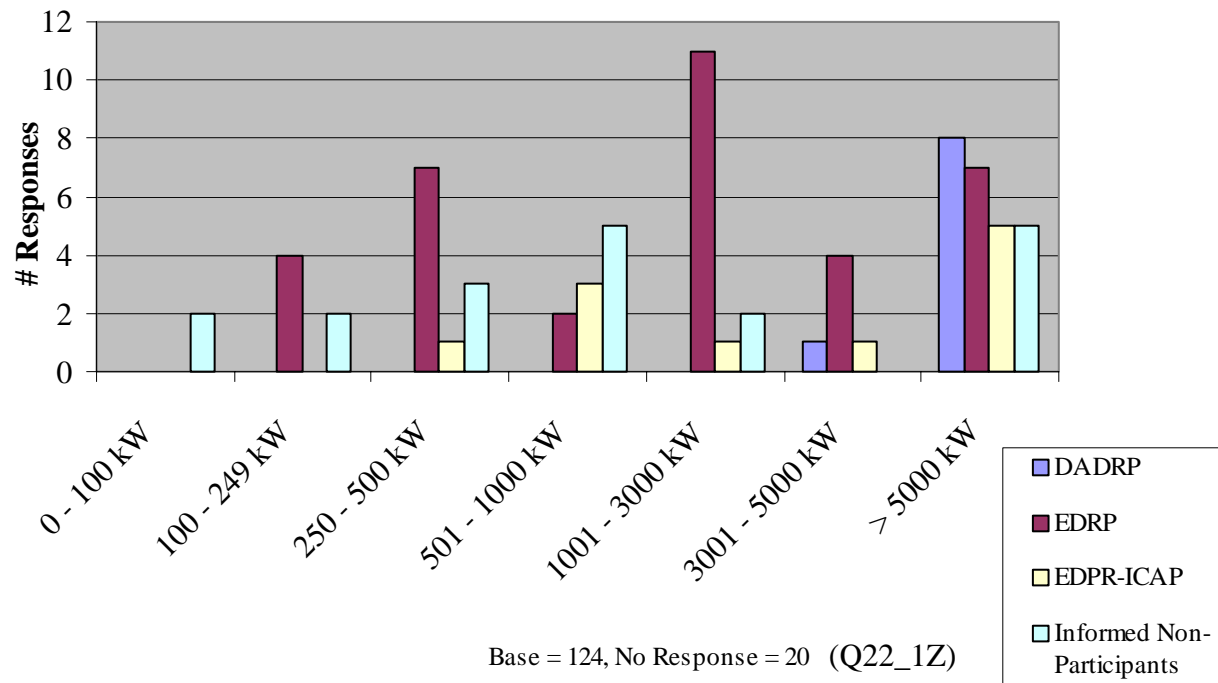
Major Activity of Respondents



- All DADRP respondents are manufacturing firms
- EDRP program respondents include manufacturing (38%) and govt./institutional with many hospitals (33%)
- Non-participants are quite heterogeneous: govt./institutional (32%), manufacturing (22%), trade and commercial office (~12% each)



Summer Peak Demand

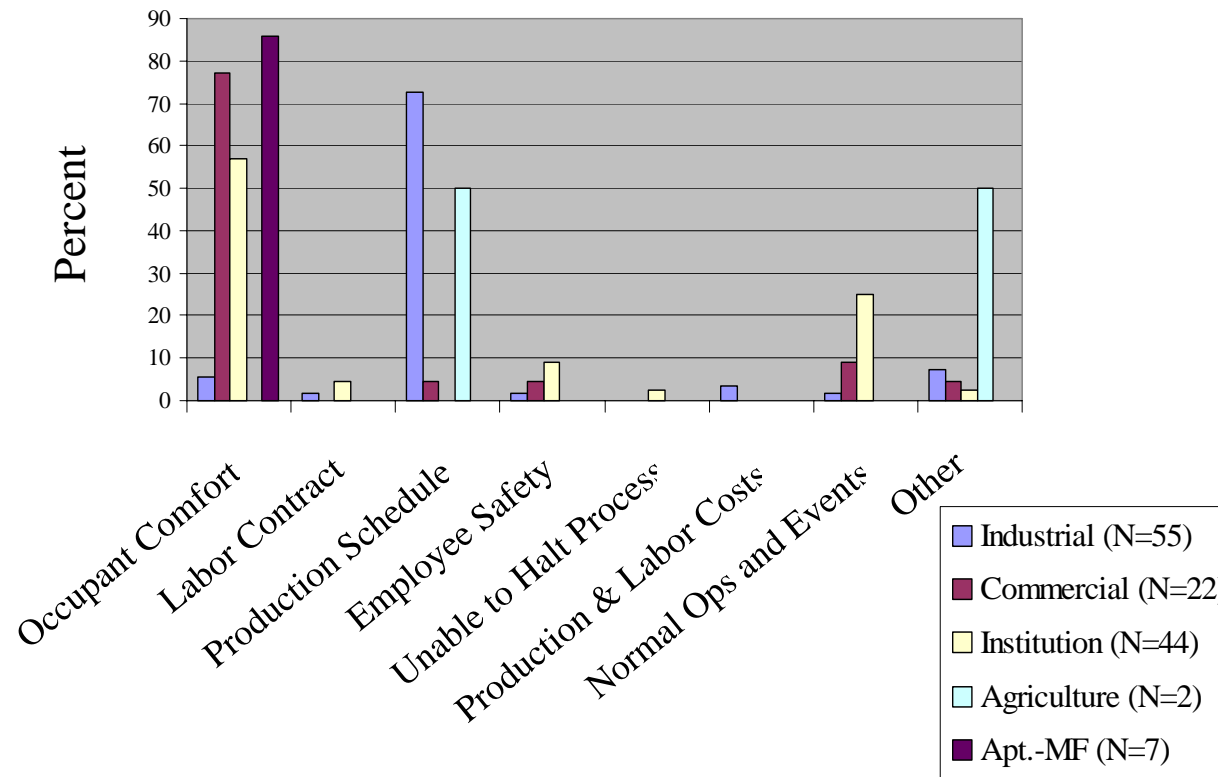


- Median summer peak demand is significantly lower for non-participants (750 kW) vs program participants
 - DADRP (14.5MW)
 - EDRP only (1.7 MW)
 - EDRP/ICAP (5 MW)



Impediments to Shifting Electricity

Usage during noon-6 pm



- ~80% of commercial, 85% of MF, and ~55% of institutional customers identified occupant comfort as the largest impediment to shifting usage
- ~75% of industrial customers identified production schedules as largest impediment

Other = Rate Design, Equipment Life, Other

